

Amendments to the Drawings:

The attached sheets of drawings include changes to **Figures 1a, 2b, and 3b**. These sheets, which includes **Figures 1a, 1b, and 2a** and **Figures 2b, 3a, and 3b** respectively, replaces the original sheets including the same.

Figures 1a, 2b, and 3b are amended to include a legend specifying PRIOR ART as suggested by the Examiner.

Attachment: 2 Replacement Sheets (Figures 1a, 2b, and 3b)
2 Annotated Sheets Showing Changes

REMARKS/ARGUMENTS

Claims 1-20 are pending in the present application. Claims 1 and 12 were amended; and claims 15-20 were added. Reconsideration of the claims is respectfully requested.

I. 35 U.S.C. § 112, Second Paragraph

The Examiner has rejected claim 1 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter, which applicants regard as the invention. This rejection is respectfully traversed. Claim 1 is amended for clarity by providing proper antecedent basis. Claim 1 has been amended to specify “characteristics” instead of “the characteristics.” Characteristics are referred to on at least pages 5 and 10.

Therefore, Applicants request withdrawal of the rejection of claim 1 under 35 U.S.C. § 112, second paragraph.

II. 35 U.S.C. § 103, Obviousness

The Examiner has rejected claims 1-5 and 7-14 under 35 U.S.C. § 103 as being unpatentable over Norwood (US Patent No. 5,983,316) filed on May 29, 1997, in view of Maurer (US Patent Application No. 20030065780) filed on September 27, 2002. This rejection is respectfully traversed.

As to claims 1-5 and 7-14, the Office Action states:

Regarding Claims 1, 8, and 12, Norwood discloses a method of converting the characteristics under which a logical volume is stored on a first physical volume group, said method comprising the steps of:

- a first processor connected as a server (column 6, lines 57-61, Norwood);
- a plurality of client processors connected to said first processor (column 7, lines 27-34, Norwood);

- a logical volume stored on a first physical volume group and connected to be accessed from said first processor and said plurality of client processors (column 4, lines 2-9, Norwood), said first physical volume having a first set of fixed characteristics (column 4, lines 22-25, Norwood); and

- allocating a second physical volume group (column 4, lines 5-11, Norwood)¹ having the desired characteristics for storing said logical volume (column 4, lines 19-24, Norwood). However, Norwood is silent with respect to setting up said second physical volume group as a temporary mirror of said first physical volume group, wherein: reads of said logical volume from an application are directed solely to said first physical volume group and write to said logical volume from an application are directed to both said first physical volume group and said second physical volume group; and synchronizing said logical volume from said first physical volume group to said second physical volume group. On the other hand, Maurer discloses setting up said second

physical volume group as a temporary mirror of said first physical volume group ([0138], lines 4-11, Maurer), wherein: reads of said logical volume from an application are directed solely to said first physical volume group ([0112], lines 1-6, Maurer)² and write to said logical volume from an application are directed to both said first physical volume group and said second physical volume group ([0015], lines 1-13, Maurer); and synchronizing said logical volume from said first physical volume group to said second physical volume group ([0055], lines 1-8, Maurer). Norwood and Maurer are analogous art because they are from the same field of endeavor of monitoring status changes of disk storage devices. It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate Maurer's teachings into the Norwood system. A skilled artisan would have been motivated to combine as suggested by Maurer at paragraph [0010], lines 1-13, in order to enable extraction of logical information in a non-complex and fast manner, so that a surrogate computer could work with replicated copies in substantially the same manner as the original source computer that operated with the standard data.

¹Examiner Notes: The step of allocating is represented in Fig.1, item 75, wherein item 74 is the first physical volume group and 75 is the second physical volume group, and there division represents the groups being allocated. To further elaborate columns 4-5, lines 66-67 and 1-2, Norwood; show the logical volume is allocate and the physical volume is "divided" (i.e. allocation).

²Examiner Notes: "Copy" corresponds to reads.

Office Action dated April 13, 2006, pages 4-5.

Office bears the burden of establishing a *prima facie* case of obviousness based on the prior art when rejecting claims under 35 U.S.C. § 103. *In re Fritch*, 972 F.2d 1260, 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992).

Amended claim 1, which is representative of the other rejected independent claims 8 and 12 with regard to similarly recited subject matter, reads as follows:

A method of converting characteristics under which a logical volume is stored on a first physical volume group, said method comprising the steps of:
allocating a second physical volume group having desired characteristics for storing said logical volume;
setting up said second physical volume group as a temporary mirror of said first physical volume group, wherein:
reads of said logical volume from an application are directed solely to said first physical volume group;
writes to said logical volume from an application are directed to both said first physical volume group and said second physical volume group; and
synchronizing said logical volume from said first physical volume group to said second physical volume group.

In this case, the Norwood and Maurer references do not teach or suggest all of the features asserted to be present by the Office. Also, the cited references do not provide any

teaching, suggestion, or incentive to combine or modify the teachings in the manner necessary to reach the presently claimed invention.

Norwood and Maurer, taken alone or in combination, fail to teach or suggest that reads of said logical volume from an application are directed solely to said first physical volume group. Maurer is directed toward creating back-ups for disaster recovery (Maurer, 0010, 0016]. The portion of Maurer cited by the Examiner states:

[0012] In another aspect of the invention, a data storage system includes a storage array having logical volumes or units that can be accessed by one or more clients via a switch. A first logical unit can be replicated to create a copy, i.e., a mirrored BCV, of the first logical unit with the storage array.

(Maurer, [0012], lines 1-6)

The Examiner further notes on page 5 that “Copy” corresponds to reads. Copy and read operations are distinct operations. A read operation is performed by a read/write head **120** by sensing the polarity of the magnetized zones (see page 4, line 18). **Figure 7B** depicts the handling of reads and writes from the application during the conversion (pages 8 and 9). A copy operation is generally known as a synchronized **read and write** operation to copy a specified portion of a logical volume. The portion of Maurer cited above specifies that the first logical unit can be replicated to create a copy. Clearly this language is distinct from reads from the application. Maurer does mention read operations but does not suggest or teach the language of claim 1 as claimed by Applicants (see [0051], lines 10 -16).

Maurer does not specify that the reads of the logical volume are directed solely to the first physical volume group. There is no language indicating where read operations are directed even though Maurer mentions read operations (Maurer [0051]).

"It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." *In re Hedges*, 228 U.S.P.Q. 685, 687 (Fed. Cir. 1986). Maurer is directed to designing embedded hardware. While Maurer may teach a method for managing replication of data, there is no teaching, suggestion, or incentive present to combine the teachings of Norwood with the teachings of Maurer in the manner asserted by the Office. That is, Norwood and Maurer, taken alone or in combination do not teach or suggest the features recited in claims 1, 8, and 12.

Furthermore, there is not so much as a suggestion in the Norwood or Maurer references to modify the references to include such features. The mere fact that a prior art reference can be readily modified does not make the modification obvious unless the prior art suggested the

desirability of the modification. *In re Laskowski*, 871 F.2d 115, 10 U.S.P.Q.2d 1397 (Fed. Cir. 1989) and also *see In re Fritch*, 972 F.2d 1260, 23 U.S.P.Q.2d 1780 (Fed. Cir. 1992) and *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1993). The Office may not merely state that the modification would have been obvious to one of ordinary skill in the art without pointing out in the prior art a suggestion of the desirability of the proposed modification.

In this case, no teaching or suggestion is present in Norwood and Maurer, either alone or in combination, to teach or suggest the needed modifications. That is, there is no teaching or suggestion present in either reference that a problem exists for directing read operations for the logical volume solely to the first physical volume group. To the contrary, Norwood is directed to managing storage resources and particularly storage copies. Maurer teaches a data restoration system for managing mirrored copies. Neither reference recognizes a need to perform the features, or similar features, as recited in claims 1, 8, and 12. In particular, neither reference addresses a need to allow a logical volume to be converted to a different format while remaining online for use by applications even as the logical volume is being converted.

Moreover, neither Norwood nor Maurer teaches or suggests the desirability of incorporating the subject matter of the other when these cited references are considered as a whole by one of ordinary skill in the art. That is, there is no motivation offered in either reference for the alleged combination. The Office alleges that the motivation for the combination is “because the references are from the same field of endeavor of monitoring status changes of disk storage devices.” As discussed above, Maurer and Norwood are used to create replicated copies and not for the purpose of allowing a logical volume to be converted to a different format without being taken offline, Norwood and Maurer, taken alone or in combination fail to teach or suggest the features recited in claims 1, 8, and 12. Thus, the only teaching or suggestion to even attempt the alleged combination is based on a prior knowledge of Applicants’ claimed invention thereby constituting impermissible hindsight reconstruction using Applicants’ own disclosure as a guide.

One of ordinary skill in the art, being presented only with Norwood and Maurer, and without having a prior knowledge of Applicants’ claimed invention, would not have found it obvious to combine and modify Norwood and Maurer to arrive at Applicants’ claimed invention. To the contrary, even if one were somehow motivated to combine Norwood and Maurer, and it were somehow possible to combine the two systems, the result would not be the invention, as recited in claim 1. The result would be combined ways of monitoring and replicating disk storage devices and mirrored copies for data protection.

With regard to claims 8 and 12, Norwood and Maurer do not teach that the first physical volume having a first set of fixed characteristics and that the second physical volume group has a second set of fixed characteristics that are different from the first set of fixed characteristics. The claim language of claims 8 and 12 more narrowly claims the characteristics of the groups and these features are not rejected or addressed by the Examiner based on the cited references. As a result, the previous rejection of claims 8 and 12 is inappropriate.

Thus, Norwood and Maurer, taken alone or in combination, fail to teach or suggest all of the features in independent claims 1, 8, and 12. Accordingly, Applicants respectively request withdrawal of the rejection of claims 1, 8, and 12 under 35 U.S.C. § 103.

Since claims 2-5 and 7-14 depend from claims 1, 8, and 12, the same distinctions between Norwood and Maurer and the claimed invention in claims 1, 8, and 12 apply for these claims.

With regard to claims 2, 9, and 13, the Examiner cites a portion of Maurer allegedly teaching blocking access by an application to a portion of the logical volume during synchronization.

At a given time, the mirrors are split so that write operations to disk no longer affect the copy. In the case where the first logical unit is no longer accessible, such as due to disk failure, the storage array can provide access to the copy of the first logical unit by the client by swapping the logical unit accessed by the host. In one embodiment, the client and/or client application is not aware that the first logical unit, e.g., original or source, logical unit is no longer being accessed. If desired, a restore can be performed from the copy to the first logical unit and application access to the first logical unit can be provided after mirror synchronization for the restore is complete.

(Maurer, [0012], lines 6-17)

Maurer does not teach that access is blocked by an application to a portion of the logical volume during synchronization. The portion of Maurer cited by the Examiner teaches that the first logical unit may become inaccessible due to disk failure and the back up copy may be made available. Maurer teaches changing data access, there is no mention of affirmative blocking during a synchronization step. Accordingly, Applicants respectively request withdrawal of the rejection of claims 1-5 and 7-14 under 35 U.S.C. § 103.

III. 35 U.S.C. § 103, Obviousness

The Examiner has rejected claim 6 under 35 U.S.C. § 103 as being unpatentable over Norwood (US Patent No. 5,983,316) filed on May 29, 1997, in view of Maurer (US Patent Application No. 20030065780) filed on September 27, 2002, as applied to claims 1-5 and 7-14

above, and further in view of Ripberger (US Patent No. 5,502,811) filed on September 29, 1993. This rejection is respectfully traversed.

Ripberger applies to storage and recovery of data and not converting a first format on a first physical volume to a second format on a second physical volume to allow a user constant access to the logical volume. Unstriping a volume is used by Ripberger for data recovery. There is no mention of a volume that is not striped being used as described in claims 1 and 6. A process for unstriping a volume and an unstriped volume are distinguishable as a method and a claimed component.

Accordingly, Applicants respectfully request withdrawal of the rejection of claim 6 under 35 U.S.C. § 103.

IV. New Claims

Claims 15-20 are added to the pending application. Support for claims 15-17, and 19 may be found on at least page 10 of the application. Support for claim 18 may be found on at least page 7. Support for claim 20 may be found on at least page 11. Consequently, no new matter is added. The new claims further claim distinguishable subject matter of the illustrative embodiments of the present invention.

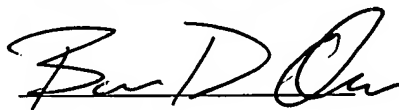
V. Conclusion

It is respectfully urged that the subject application is patentable over Norwood, Maurer, and Ripberger and is now in condition for allowance.

The Examiner is invited to call the undersigned at the below-listed telephone number if in the opinion of the Examiner such a telephone conference would expedite or aid the prosecution and examination of this application.

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Respectfully submitted,



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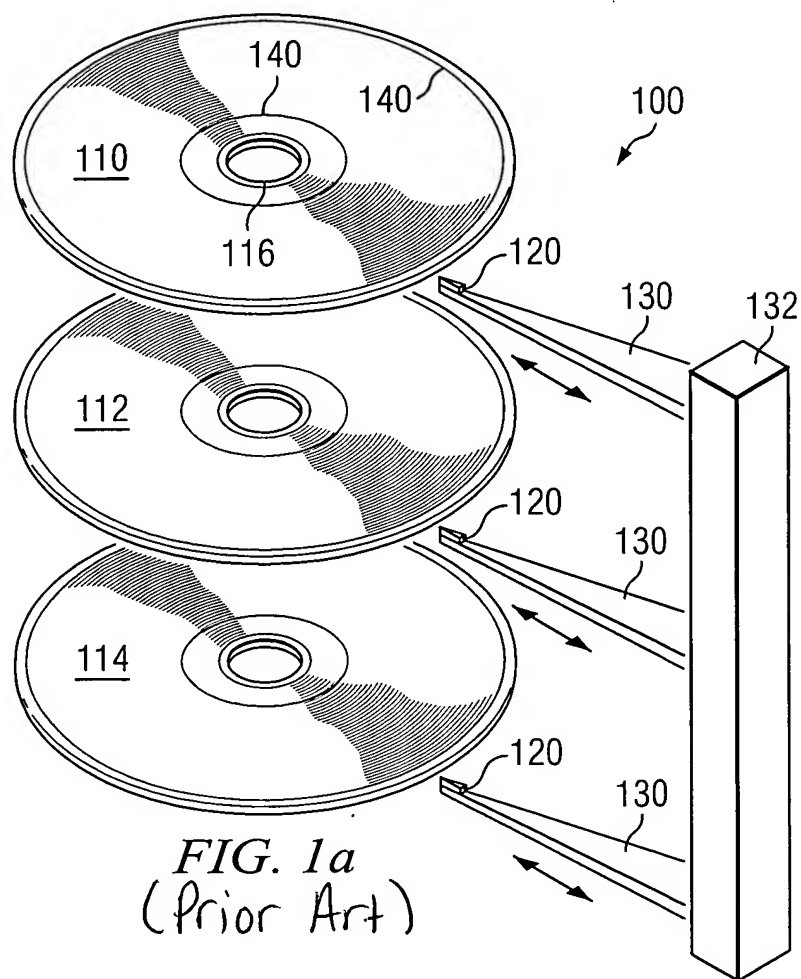


FIG. 1a
(Prior Art)

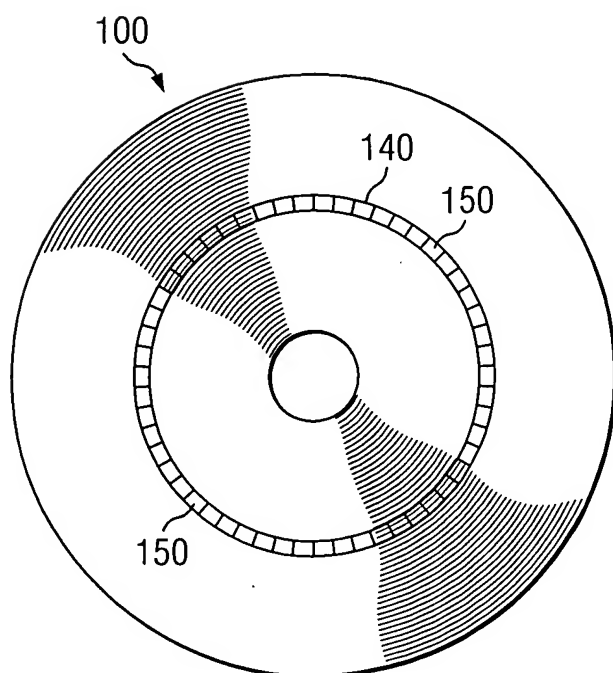


FIG. 1b
(PRIOR ART)

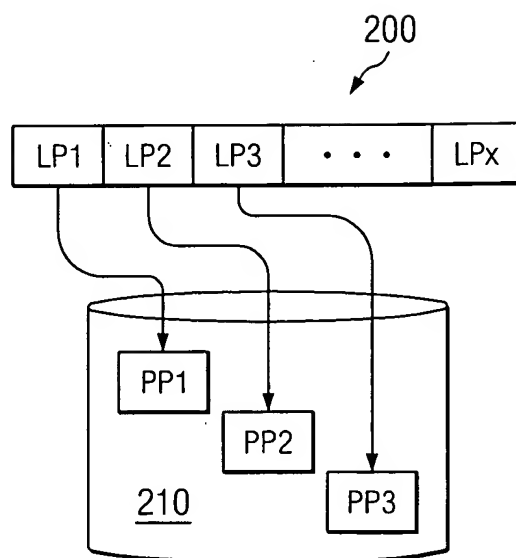


FIG. 2a
(PRIOR ART)

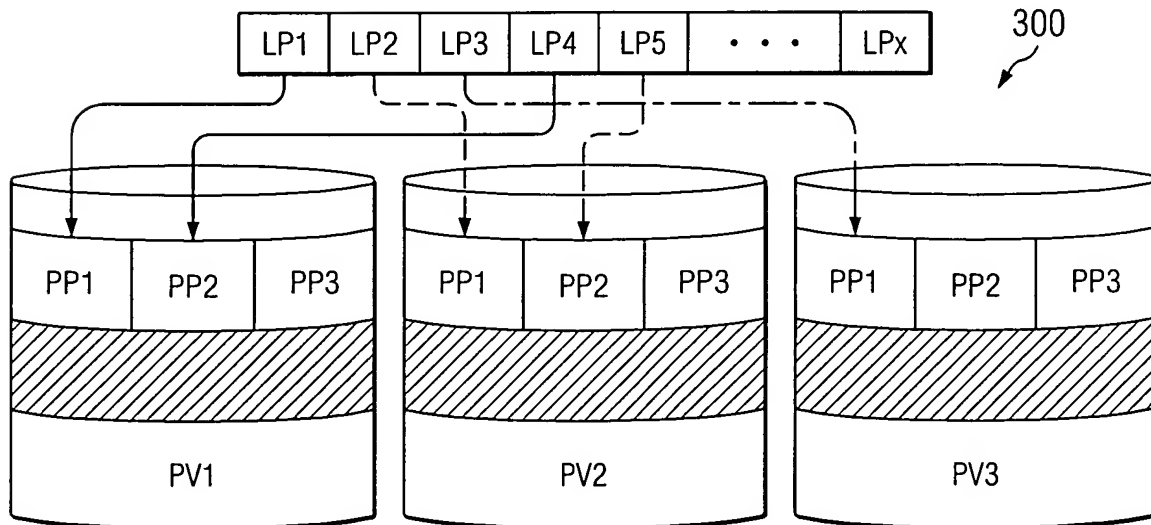
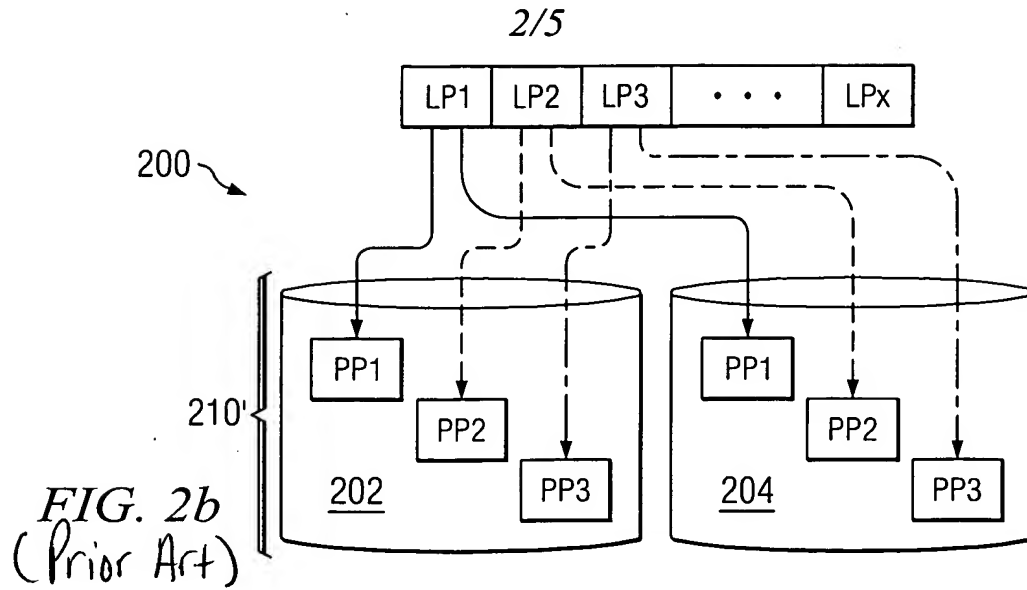


FIG. 3a
(PRIOR ART)

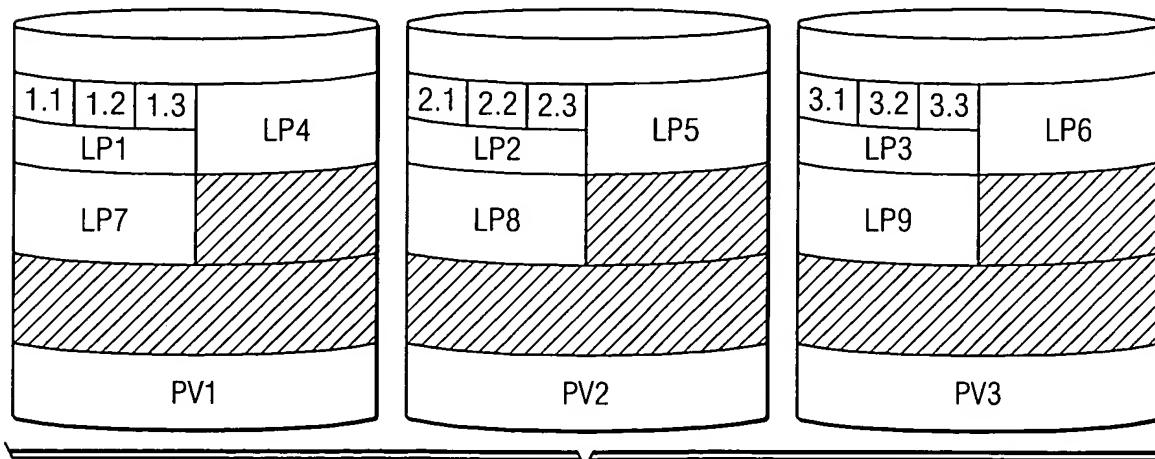


FIG. 3b
(Prior Art)